

FORM PTO 1360
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

LAGROTH-023

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

09/830864INTERNATIONAL APPLICATION NO.
PCT/SE99/01964INTERNATIONAL FILING DATES
1 NOVEMBER 1999PRIORITY DATE CLAIMED
2 NOVEMBER 1998TITLE OF INVENTION METHOD AND ARRANGEMENT FOR THE CONTINUOUS PRODUCTION OF
LIGNOCELLULOSE-CONTAINING BOARDS

APPLICANT(S)

Göran LUNDGREN, et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to promptly begin national examination procedures (35 U.S.C. 371 (f)).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c)(2))
 - a. ☐ is attached hereto (required only if not transmitted by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371 (c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). (Unexecuted)
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98. w/PTO-1449, ___ references
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 & 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☒ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☒ Other items or information:

Substitute Abstract

Marked-up Specification

Copy of International Application as published

Copy of International Preliminary Examination Report

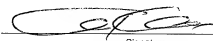
Copy of International Search Report

One (1) Sheet Formal Drawing

BRI Form PTO-1360 (Rev. 10-98)

Page 1 of 2

EXPRESS MAIL LABEL NO. EL804524098US**DATE:** May 1, 2001

U.S. APPLICATION NO. 097/830864 (37 CFR 1.5) INTERNATIONAL APPLICATION NO. PCT/SE99/01964	ATTORNEY'S DOCKET NUMBER LAGROTH-023
17. <input checked="" type="checkbox"/> The following fees are submitted:	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):	
<input checked="" type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1,000.00	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00	
<input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710.00	
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00	
<input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00	
ENTER APPROPRIATE BASIC FEE AMOUNT = 1,000.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	
CLAIMS	NUMBER FILED
Total claims	*8 - 20 = x \$18.00
Independent claims	2 - 3 = x \$80.00
MULTIPLE DEPENDENT CLAIM(s) (if applicable) + \$270.00	
TOTAL OF ABOVE CALCULATIONS = 1,000.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.	
SUBTOTAL = 1,000.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +	
TOTAL NATIONAL FEE = 1,000.00	
Fee for recording the enclosed assignment (37 CFR 1.21 (h)). Assignment must be accompanied by appropriate cover sheet (37 CFR 3.28, 3.31) (\$40.00 per property). +	
TOTAL FEES ENCLOSED = 1,000.00	
*As In Preliminary Amendment	
Amount to be: Refunded Charged	
a. <input type="checkbox"/> A check in the amount of _____ to cover the above fees is enclosed.	
b. <input checked="" type="checkbox"/> Please charge my Deposit Account No. 12-1095 in the amount of \$ 1,000.00 to cover the above fees. A duplicate copy of this sheet is enclosed.	
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required or credit any overpayment to my Deposit Account No. 12-1095. A duplicate copy of this sheet is enclosed.	
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.	
SEND ALL CORRESPONDENCE TO:	
Lerner, David, Littenberg, Krumholz & Mentlik, LLP 600 South Avenue West Westfield, NJ 07090 Telephone 908 654-5000 Facsimile 908 654-7866	
 Signature	
ARNOLD H. KRUMHOLZ Name 25,428 Registration Number	

097/830864-00000001

09/830864

JC18 Rec'd PCT/PTO 01 MAY 2001

PATENT
LAGROTH 3.3-023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of :
LUNDGREN et al. :
 : Group Art Unit:
International Application No. :
PCT/SE99/01964 : Examiner:
 :
International Filing Date: : Date: May 1, 2001
1 November 1999 :
 :
For: METHOD AND ARRANGEMENT FOR :
THE CONTINUOUS PRODUCTION OF :
LIGNOCELLULOSE-CONTAINING :
BOARDS :
 :
 : X

Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Preliminary to initiation of the prosecution of the above-identified pending U.S. patent application, the following amendments and remarks are respectfully submitted.

IN THE ABSTRACT

Please delete the Abstract as filed and substitute therefor the attached revised Abstract.

IN THE SPECIFICATION

Please amend the Specification in accordance with the attached revised Specification.

IN THE CLAIMS

Please cancel claims 1-6 and add new claims 7-14.

7. (NEW) A method for producing lignocellulosic boards from a mat of lignocellulosic material comprising compressing said mat in a steam injection press to form said lignocellulosic boards and produce steam and gaseous emissions therein, capturing said steam and gaseous emissions, and supplying hot air to said steam injection press, whereby

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condensation of said steam, said gaseous emissions, and any leakage of air from the surroundings is prevented.

8. (NEW) The method of claim 7 including transporting said steam and gaseous emissions to a combustion plant.

9. (NEW) The method of claim 8 wherein said combustion plant has a predetermined required amount of combustion air, and including supplying said hot air and any of said leakage air to said steam injection press in an amount which is not greater than said predetermined required amount.

10. (NEW) The method of claim 7 wherein said supplying of said hot air to said steam injection press includes supplying said hot air to a curing zone in said steam injection press at a temperature of greater than 100°C.

11. (NEW) The method of claim 8 including passing said lignocellulosic boards to an after-conditioning unit which generates a stream of suction air, heating said stream of suction air to a temperature greater than 100°C, and using said stream of heated suction air for said supplying of said hot air to said steam injection press.

12. (NEW) Apparatus for producing lignocellulosic boards from a mat of lignicellulosic material comprising a steam injection press for compressing said mat to form said lignocellulosic boards and produce steam and gaseous emissions therefrom, a suction member for capturing said steam and gaseous emissions, and a hot air unit for supplying hot air to said steam injection press whereby condensation of said steam, said gaseous emissions, and any leakage air from the surroundings is prevented.

13. (NEW) The apparatus of claim 12 including an after-conditioning unit for subsequently conditioning said lignocellulosic boards and generating a stream of suction air, a heater for heating said stream of suction air, and supply means for supplying said heated stream of suction air to said hot air unit.

14. (NEW) The apparatus of claim 12 including transport means for transporting said steam and gaseous emissions to a combustion plant.

REMARKS

The above-noted cancellation of claims 1-6, and addition of new claims 7-14, as well as the submission of a new Abstract and revisions to the Specification, are respectfully submitted prior to initiation of the prosecution of this application in the U.S. Patent and Trademark Office.

The above-noted new claims are respectfully submitted in order to more clearly and appropriately claim the subject matter which applicants consider to constitute their inventive contribution. No new matter is included in these amendments. In addition, the revisions to the Abstract and Specification are submitted in order to clarify and correct the Abstract and Specification and to conform them to all of the requirements of U.S. practice. No new matter is included in these amendments.

In view of the above, it is respectfully requested that these amendments now be entered, and that prosecution on the merits of this application now be initiated. If, however, for any reason the Examiner does not believe such action can be taken, it is respectfully requested that he telephone applicant's attorney at (908) 654-5000 in order to overcome any objections which he may have.

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If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge applicant's Deposit Account No. 12-1095 therefor.

Respectfully submitted,

LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK, LLP



ARNOLD H. KRUMHOLZ
Reg. No. 25,428

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305875_1.DOC

**METHOD AND ARRANGEMENT FOR THE CONTINUOUS PRODUCTION OF
LIGNOCELLULOSE-CONTAINING BOARDS**

The present invention relates to a method of producing continuously ligno-cellulosic boards in accordance with the preamble of claim 1, and to an arrangement for carrying out the method.

Methods of producing boards from lignocellulose-based raw materials are well known to the art and have found wide use in practice. The manufacture of such boards includes the following main method steps: disintegration of the raw material to fibres and/or particles of appropriate size, drying the particles and/or fibres to a determined moisture ratio and gluing the material either prior to or subsequent to said drying process, shaping the glued material to form a mat, which may comprise several layers, and optionally cold pre-pressing the mat, pre-heating said mat, water-spraying mat surfaces etc., and heat pressing the mat in a continuous press or in a continuous press while subjecting the material simultaneously to pressure and heat so as to obtain a finished board.

A well-known problem with present day manufacturing technology, irrespective of whether it involves discontinuous presses or continuous presses, is that gases are generated in the press during the compression process, which takes place at high temperatures. These gases consist of water vapour (steam), different volatile substances dissolved from wood and glue, so-called Volatile Organic Compounds (VOC), and gaseous phenol from wood and glue, etc. It has been found that long-time exposure to these substances results in irritation, and that they are also harmful to personal health when present in sufficiently high concentrations. Consequently, the authorities in the majority of countries in which boards are manufactured in accordance with the aforesaid methods have elaborated a set of rules and regulations that state the emission concentrations that are permitted in work places and the permitted concentrations permitted in emissions to atmosphere.

Since present day press technology involves the use of homogenous heating plates or steel bands, only a minor part of the gases generated in press will leave the boards through their edges in the compression process. However,

the major part of these gases will leave the board as it exits from the press. The influence of these gases on the working environment can be limited to some extent with the aid of protective casings and covers, although air at room temperature is normally used as transport air because of the large size of the presses.

5 Consequently, this air volume will normally exceed the requirement of combustion air in the standard heating plant of the factory. This has necessitated the installation of complicated and expensive equipment in connection with the majority of plants in which lignocellulosic sheets and boards are produced. For instance, the plants will normally include so-called RTO (Regenerated Thermal Oxidizer) units
10 or scrubber systems for purifying press gases.

The object of the present invention is to provide a method and an arrangement for producing lignocellulosic boards without VOC-emissions or formaldehyde-emissions to the workshop areas concerned and to the ambient environment, and also obviating the need to install expensive purification equipment. This
15 object is achieved with a method and an arrangement according to the invention that have the characteristic features set forth in respective claims.

The invention will now be described in more detail with reference to the accompanying drawing, which is a schematic longitudinal section view of an arrangement in accordance with the invention.

20 The plant illustrated in the drawing is based on the plants disclosed in SE 502 272 and SE 504 638, which describe two continuous steam-press processes. A fibrous mat 1 previously formed in the manufacturing process is compressed in a continuous steam-injection press 2 to form a board or sheet 3, which is then passed through an after-conditioning unit 4. As the fibre mat 1 passes into the nip
25 between two steam-injection rolls 5, steam is delivered and injected into the mat through wires 6. The temperature rises very quickly to above 100°C; a typical temperature is above 120°C. The mat is herewith formed into a solid board 3. The pressure falls as the board leaves the nip between the steam-injection rolls 5, and the temperature therewith drops very quickly to about 100°C. This takes place by
30 virtue of the extremely rapid vaporisation of part of the enclosed moisture. VOC-emissions and formaldehyde-emissions accompany the departing steam.

Because this process takes place between two gas-permeable wires 6, the steam and the gases departing with the steam are able to leave the board across the whole of its width. Steam and other emissions are captured before being able to escape into the workshop area or to ambient atmosphere, by a suction unit 8 provided to this end inside the press. Air heated to a temperature in excess of 100°C is transported to this suction unit. The hot air is used together with leakage air from the surroundings as a vehicle gas for the steam and said other emissions. The hot air, leakage air, steam and emissions are transported to a heating plant 9 in the factory, for combustion. A hot air delivery unit 11 is connected to a curing zone 10 in the press 2, and the hot air supplied is then passed to the suction unit 8.

The temperature is maintained at a high level partly to prevent the emissions and the steam from condensing out to the suction system and partly to utilize the fact that the moisture carrying capacity of the air, calculated per kilogram of air, increases with increasing temperatures. This enables the total air volumes and gas volumes to be maintained at levels which do not exceed the volumes of combustion air that are required by the standard plant system to generate the heat and process steam necessary for the production of such board material. Consequently, no other equipment need be installed to prevent emissions to the surroundings.

Subsequent to the board having been produced in the continuous steam injection press 2, the board is passed into the after-conditioning unit 4 (see SE 504 638) where a pre-determined volume of air heated to a pre-determined temperature and having a pre-determined moisture content is sucked through the board so as to obtain a desired board moisture content and temperature. The air leaving the after-conditioning unit will also contain emissions of VOC and formaldehyde, although in smaller quantities; measurements taken in a pilot plant have shown that the major part of the emissions occur in the continuous steam-injection press. For this purpose, a suction unit 12 is arranged in the after-conditioning unit 4. Air is sucked in at 13 and heated by a heater 14 and is supplied with steam through the conduit 15.

The air leaving the after-conditioning unit is transported to the hot air supply unit 11 of the steam-injection press 2 and its curing zone 10, by means of a suction fan 16. As it passes to the supply unit 11, the air is given additional energy through the medium of a heat exchanger 17. If the air from the after-conditioning unit 4 is in excess, the excess can be mixed with the flow from the press 2 in a closed hood 18 and passed to the heating plant 9. If there is a deficiency of air to the curing zone 10, the suction fan 16 draws-in extra air through the closed hood 18. The air leaving the after-conditioning unit 4 is thus used as hot input air for the internal suction unit 8 of the continuous steam-injection press. Measurements have shown that these volumes are sufficient to fulfil the requisite transport volumes needed for the continuous steam-injection press.

Subsequent to having passed through the after-conditioning unit 4, the board 3 may optionally also be passed through a surface-densifying press in accordance with SE 502 272 (not shown in the drawing). This latter press also includes a special suction unit that functions to capture in said press those emissions that are transported to the combustion plant of the factory with the aid of hot air, for the production of heat and steam.

CLAIMS

1. A method for the continuous production of lignocellulosic boards, in which the material is disintegrated into particle and/or fibre form, glued, dried and formed into a mat (1) which is compressed in a continuous steam-injection press (2) into board form (3) and the board is thereafter passed through an after-conditioning unit (4), **characterized** by capturing steam and gaseous emissions generated in the press process, and supplying hot air to said process for the purpose of preventing condensation of the gaseous emissions and said steam when admixing said emissions and steam with leakage air from the surroundings and also to prevent condensation of said leakage air from the surroundings, and for transporting the emissions to a combustion plant (9) for combustion.

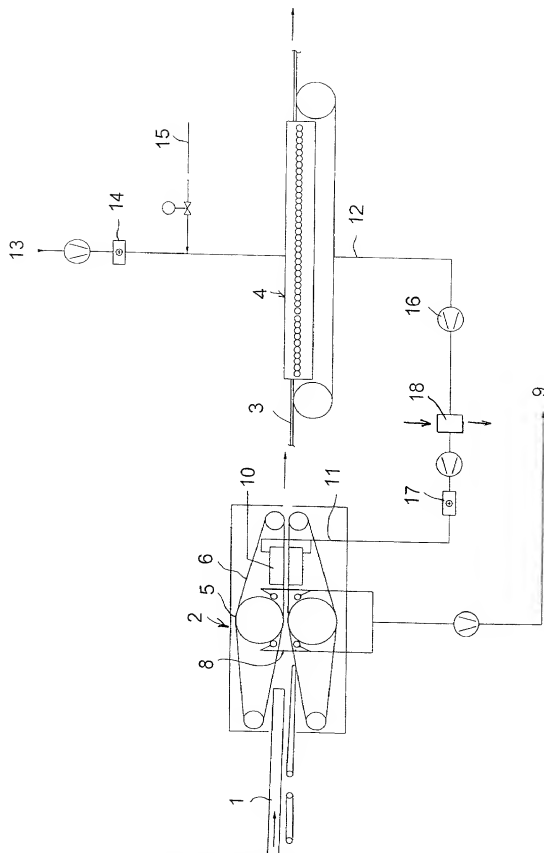
2. A method according to claim 1, **characterized** in that the hot air and the leakage air from the surroundings are supplied in an amount which is at most equal to the amount of combustion air required by the heating plant (9).

3. A method according to claim 1 or 2, **characterized** by supplying to a curing zone (10) in the press (2) air that has a temperature in excess of 100°C.

4. A method according to any one of claims 1-3, **characterized** by supplying energy to the suction air from the after-conditioning unit (4) so that the temperature will exceed 100°C, and thereafter using the air as vehicle air for the transportation of emissions from the steam-injection press (2).

5. An arrangement for carrying out the method according to any one of claims 1-4, said arrangement including a continuous steam-injection press (2) and an after-conditioning unit (4), **characterized** by a suction unit (8) arranged in the steam-injection press (2) and functioning to capture gaseous emissions and steam and to transport said emissions and steam to a combustion plant (9), and further characterized by a unit (11) for supplying hot air to the suction unit (8).

1/1



DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION

ATTORNEY'S DOCKET NO.: LAGROTH-023

As a below-named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name;
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD AND ARRANGEMENT FOR THE CONTINUOUS PRODUCTION OF LIGNOCELLULOSE-CONTAINING BOARDS the specification of which

☐ is attached hereto

☒ was filed on 1 NOVEMBER 1999 as United States Application Number or PCT International Application Number PCT/SE99/01964 and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or § 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (month, day, year)	PRIORITY CLAIMED
SE	9803741-9	NOVEMBER 2, 1998	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
			YES <input type="checkbox"/> NO <input type="checkbox"/>
			YES <input type="checkbox"/> NO <input type="checkbox"/>
LISTING OF FOREIGN APPLICATIONS CONTINUED ON PAGE 3 HEREOF <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

Application Number:

Filing Date:

Application Number:

Filing Date:

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Parent Application Serial Number:

Parent Filing Date:

Parent Patent No.:

U.S. Parent Application Serial Number:

Parent Filing Date:

Parent Patent No.:

PCT Parent Number:

Parent Filing Date:

LISTING OF US APPLICATIONS CONTINUED ON PAGE 3 HEREOF: ☐ YES ☒ NO

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Customer Number 000530

DIRECT ALL CORRESPONDENCE TO: Customer No. 000530

DECLARATION -- Page 2

ATTORNEY DOCKET NO. LAGROTH-023

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor (given name, family name): Göran LUNDGREN

Inventor's signature [Signature] Date July 30, 2001

Residence: Alnö, Sweden Citizenship: Sweden SEX

Mailing Address: Metkroksvägen 2, S-865 91 Alnö, Sweden

Full name of second joint inventor, if any (given name, family name): Olof MELANDER

Second Inventor's signature [Signature] Date July 30, 2001

Residence: Sundsvall, Sweden Citizenship: Sweden SEX

Mailing Address: Norra Vägen 39, S-856 31 Sundsvall, Sweden

Full name of third joint inventor, if any (given name, family name): Kurt SCHEDIN

Third Inventor's signature [Signature] Date July 30, 2001

Residence: Sundsvall, Sweden Citizenship: Sweden SEX

Mailing Address: Högalidsgatan 34, S-856 31 Sundsvall, Sweden

Full name of fourth joint inventor, if any (given name, family name):

Fourth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Mailing Address: _____

Full name of fifth joint inventor (given name, family name):

Fifth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Mailing Address: _____

Full name of sixth joint inventor, if any (given name, family name):

Sixth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Mailing Address: _____

Full name of seventh joint inventor, if any (given name, family name):

Seventh Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Mailing Address: _____

Full name of eighth joint inventor, if any (given name, family name):

Eighth Inventor's signature _____ Date _____

Residence: _____ Citizenship: _____

Mailing Address: _____

☐ Additional inventors are being named on separately numbered sheets attached hereto.